

# **Verification and Validation of the Comparative Vendor Score**

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## **Abstract**

This paper analyzes the components of the linear form that defines the method for evaluating supplier companies. The paper discusses the applicability of the developed linear form to compare suppliers. We present plots of the companies score with the main factors.

**Keywords:** Vendor score, Linear form, Compare vendors.

## **1 Introduction**

The task of choosing vendors by clear and simple mathematically sound estimates is highly relevant today (see. [1-5]). In this work we consider the method of calculation of the vendor score and received from it the comparative score, developed in [6]. The purpose of this review is testing the proposed scores for suitability for the calculation and learning, validation and verification of the dependence of the scores with the main factors determining the financial and economic attractiveness of the business entity.

In the factor analysis, we obtained a set of indicators that determine the production and business activities score of the vendor. This is done from the point of view of the consumer — Russian railway company[7].

## 2 Calculation methods of the vendor scores

As it was suggest in [6] the vendor score:

$$\Omega^{(i)} = w_1\alpha_1 E_i + w_2\alpha_2 F_i + w_3\alpha_3 \frac{1}{1+10(D_i-\beta_{opt})^2} + w_4\alpha_4 \frac{1}{1+10(R_i-\delta_{opt})^2} + \\ w_5\alpha_5 \frac{1}{1+10(S_i-\chi_{opt})^2} + w_6\alpha_6 W_i + w_7\alpha_7 \frac{1}{K_i} + w_8\alpha_8 \frac{1}{1+10(B_i-\gamma_{opt})^2} + w_9\alpha_9 \frac{1}{I_i} + \\ w_{10}\alpha_{10} L_i + w_{11}\alpha_{11} \sqrt{M_i} + w_{12}\alpha_{12} \frac{1}{C_i},$$

were Efficiency of enterprise asset  $E$ , Capital intensity  $F$ , The share  $D$  of total production, sold to consumer company, Profitability  $R$  characterizes the performance of the vendor as a result of the profit, The share of loans in the vendor's turnover  $S$ , The share of own funds allocated for the development of the vendor  $W$ , The share of loanable funds to the development of enterprises in relation to the enterprise asset  $K$ , Share of capacity utilization for the reporting period  $B$ , The wear  $I$  active fixed production assets of the enterprise, The share of sales for the period  $L$ , The range of products of various kinds (types) of products produced by the vendor, Unit cost of production enterprises, including delivery,  $C$ .

## 3 Verification results

Below are figures showing the dependence of the scores with various factors.

The calculations will be carried out as follows

1. Let us fix the weights  $\alpha_1, \dots, \alpha_{13}$  as it shown in table 1. The values of weights, of course, are not final, and perhaps only chosen for the calculations.

$\alpha$	1	2	3	4	5	6	7	8	9	10	11	12	13
Value	0,02	0,1	0,2	0,05	0,1	0,05	0,1	0,2	0,1	0,05	0,05	0,05	0,05

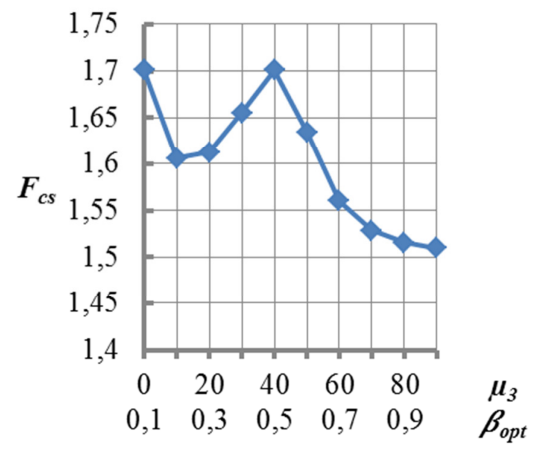
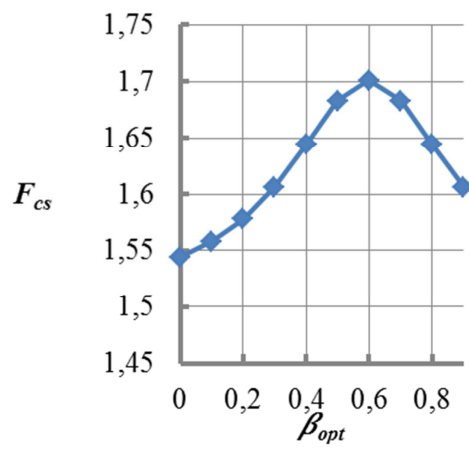
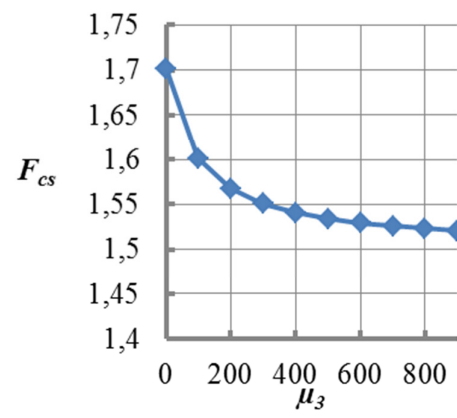
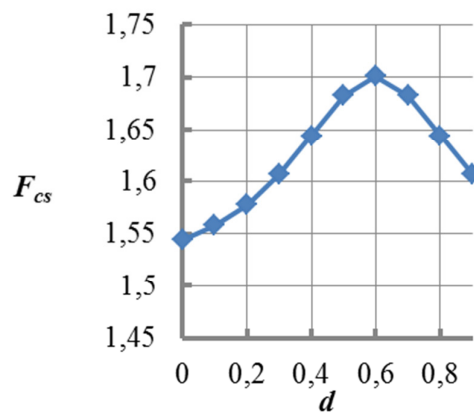
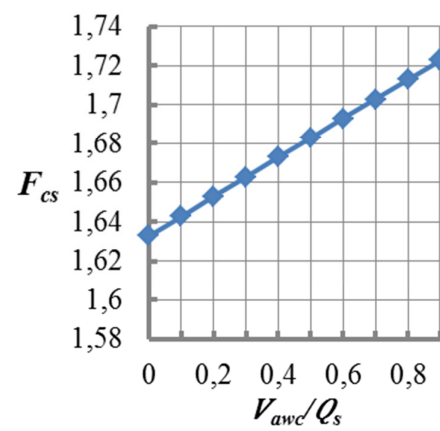
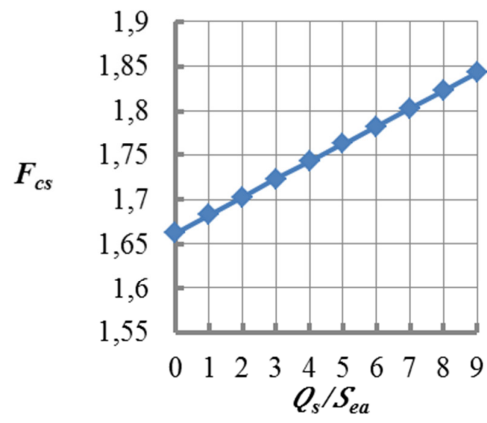
Table 1. Weights selected for numeric experiment

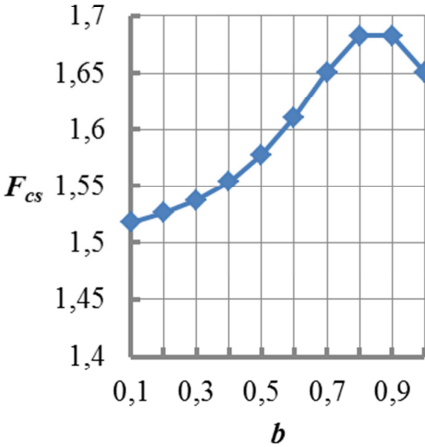
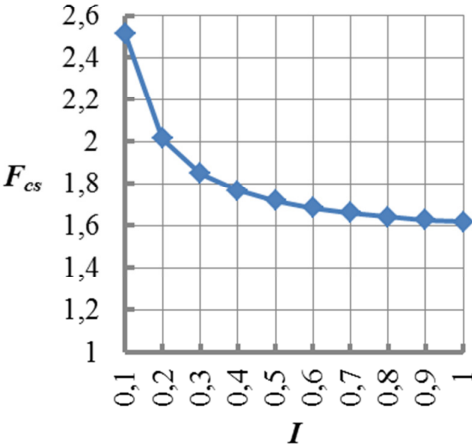
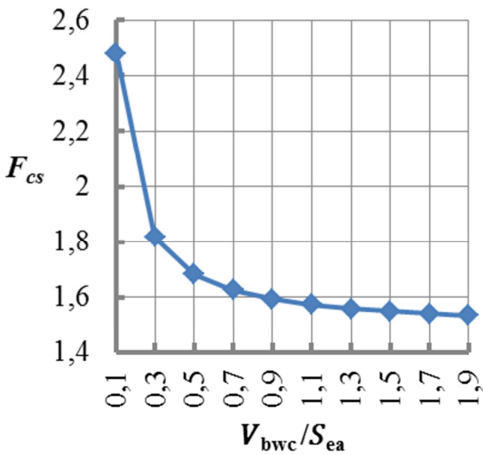
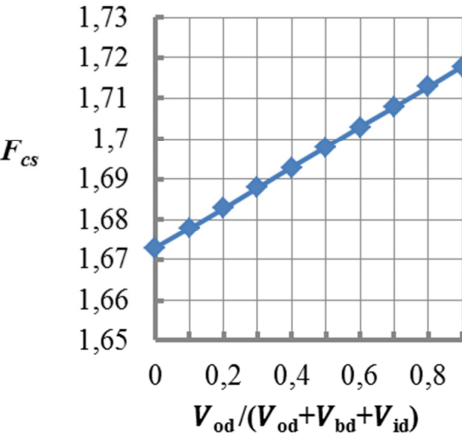
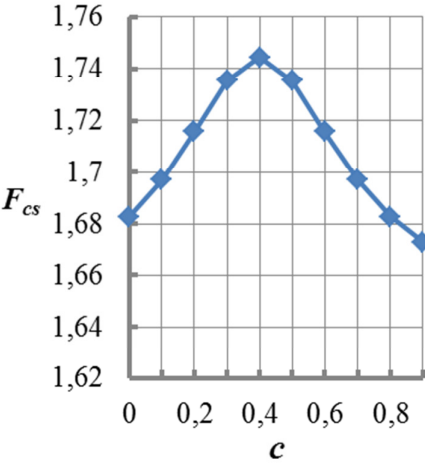
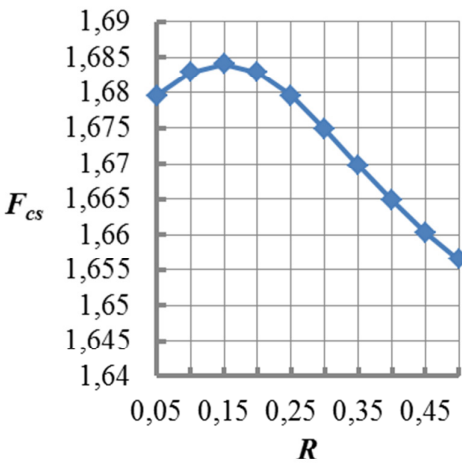
2. We fix a base for calculating the values of the factors on which they depend vendor score  $F_{cs}$  (see table 2).

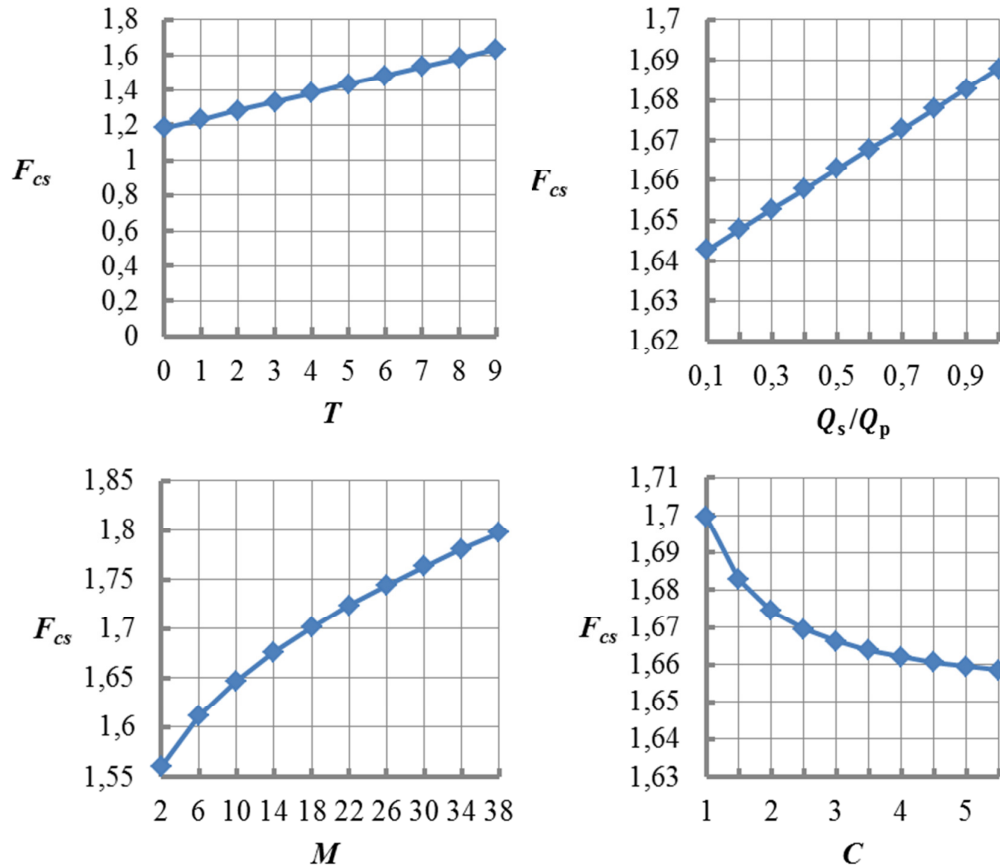
Factor	Value	Factor	Value
$\frac{Q_s}{S_{ea}}$	1	$\frac{V_{od}}{S_{ea}}$	0,5
$\frac{V_{awc}}{Q_s}$	0,5	$b$	0,9
$d$	0,5	$\mu_8$	10
$\mu_3$	10	$\gamma_{opt}$	0,85
$\beta_{opt}$	0,6	$I$	0,6
$R$	0,1	$T$	10
$\mu_4$	10	$\frac{Q_s}{Q_p}$	0,9
$\delta_{opt}$	0,15	$M$	15
$c$	0,8	$C$	1,5
$\mu_5$	10	$\frac{V_{bd}}{S_{ea}}$	0,5
$\chi_{opt}$	0,4	$b$	0,9
$\frac{V_{od}}{V_{od} + V_{bd} + V_{id}}$	0,2	$\mu_8$	10

Table 2. Used to calculate the values of the factors that determine the vendors score  $F_{cs}$

3. To plot the dependence of the vendor score of certain factors that will perform calculations with recorded in Table 1 weight coefficients in Table 2, the basic values of the factors and variables, the values of this factor.







The analysis in this article, a series of numerical experiments suggests full compliance indicators developed appeal to their requirements. In particular, not only tested the suitability of the method to practical calculations, but also the validity of dependency vendor score of the factors determining it.

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**Received: July 24, 2013**